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EXAMINER	
SANTOS, JOSEPH M	

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Please find below and/or attached an Office communication concerning this application or proceeding.

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debbie.henn@philips.com
vera.kublanov@philips.com
marianne.fox@philips.com

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/574,184
Filing Date: March 30, 2006
Appellant(s): SCHWARTZ, GARY A.

W. Brinton Yorks, Jr.
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 01/12/2011 appealing from the Office action mailed 08/06/2010.

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

Claims 1-16 are pending and stand rejected.

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN

REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

5,797,846	Seyed-Bolorforosh	08-1998
6,551,246	Ustuner	04-2003
2002/0045822	Powers	04-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-9, and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seyed-Bolorforosh et al (Seyed) (US 5,797,846) in view of Powers et al (US 2002/0045822). Seyed teaches a system and method to sample a volumetric region by obtaining a high frame rate while limiting the spatial aliasing, comprising: a two dimensional array, a beamformer 2, processor 4, and a scan coverter/display 8. In accordance, the ultrasound beam distribution is adjusted according to the scan format and the beam width. The beam width is proportional to the point spread function (which is the product of the F number and the operating wavelength; the F number equals the focal depth divided by the aperture). Seyed teaches a method of changing the focal depth or the aperture width to obtain an optimal minimum number of beams fired. Therefore, modifying the point spread function to satisfy the Nyquist spatial sampling criteria by maintaining the number of beams to the optimal minimum (col. 1 line 60 to col. 2 line 46 and

Figs. 3A and 3B). Further, Seyed teaches the beam distribution can be dependent on the apodization or window shading function (col. 4 lines 29-31). It should be noted that in the applicant's specification is disclosed that the point spread function is determined by the size of the transducer aperture employed and the apodization used at the aperture (see pg. 4, 2nd paragraph of applicant's disclosure). In addition, Seyed teaches a scan controller which controls the beam distribution and the beam density (col. 4, lines 6-9). Seyed further teaches that the transducer array can vary each successive firing ray to obtain a steering angle which is significantly different than the steering angle of the previous firing ray (col. 5, lines 47-50), therefore providing for beam overlapping. Seyed further teaches changing the transmitted and/or received beams in the azimuth and longitudinal dimensions (Figs. 3A and 3B), and further varying the beamforming parameter of each of the firings rays to provide a change in the focus position of the ray or otherwise changing the spatial position of the received data for each firing (col. 1, lines 24-34). It would have been obvious to one ordinary skilled in the art to fire two different rays with different line densities, one density less than the other, and to further overlap these rays using the scan controller and methods teach by Seyed in order to optimize the frame rate versus a desired resolution and spatial aliasing. Further, it would have been obvious to one ordinary skilled in the art that having Seyed scanned a volumetric area in azimuth and longitudinal dimension, the invention of Seyed would efficiently scan a volumetric region in both symmetrical/asymmetrical azimuth and elevation dimensions in order to provide a user desired scanning area. It would have been obvious to one ordinary skilled in the art to further vary the aperture width of the transducer in order to provide a desired point spread function parameter. Seyed discloses using a linear transducer array. Seyed fails to teach using a two-

dimensional transducer array to acquire the three-dimensional scanning. In the same field of endeavor Powers discloses a two-dimensional array ultrasonic diagnostic imaging transducer in order to acquire a three-dimensional imaging volume. It would have been obvious to one skilled in the art to have modified Seyed such that a two-dimensional transducer can be used instead of a linear transducer in order to acquire a volumetric region using a desire imaging pattern. Such a modification will further allow for varying the azimuth and elevation dimensions of the beamformer.

Claims 10-13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seyed-Bolorforosh (5,797,846) in view of Powers et al (US 2002/0045822), as applied to claim 9, and further in view of Ustuner et al. (6,551,246). Seyed teaches the system as disclosed above but fails to teach the specific use of apodization to provide a required point spread function. Ustuner et al., in the same field of endeavor, teach that apodizations parameter associated with a pair of transmitted rays is selected such that the spatial frequency spectrum, and therefore the point-spread function have an acceptable structure (col. 15, lines 8-11). Ustuner further teach that the beam-width/side-lobe compromise through the angle of the transmit wave and the apodization parameter (col. 3, lines 12-15). It would have been obvious to one ordinary skilled in the art to use the apodization to control the point spread function and therefore providing a effective spatial sampling in order to provide an ultrasound transmitting/receiving mechanism that can improve the point spread function. Finally, it would have been obvious to one ordinary skilled in the art that the apodization parameter will vary based on the beam angle as taught by Ustuner et al.

(10) Response to Argument

With respect to the appellant argument that the modified Seyed cannot scan in three dimensions, the examiner disagrees. Powers discloses a 2-D array transducer in order to acquire 3-D images. Seyed discloses, and further pointed out by the appellant's own arguments in pg. 8 of the Appeal Brief, that the Seyed invention is use in two- and three-dimensional imaging. With respect to the appellant argument that Seyed-Bolorforosh does not teach controlling the point spread function of the beam, the Examiner respectfully disagrees. As noted above, Seyed discloses the ultrasound beam distribution is adjusted according to the scan format and the beam width. The beam width is proportional to the point spread function (which is the product of the F number and the operating wavelength; the F number equals the focal depth divided by the aperture). Seyed teaches a method of changing the focal depth or the aperture width to obtain an optimal minimum number of beams fired. Therefore, modifying the point spread function to satisfy the Nyquist spatial sampling criteria by maintaining the number of beams to the optimal minimum (col. 1 line 60 to col. 2 line 46 and Figs. 3A and 3B). Further, Seyed teaches the beam distribution can be dependent on the apodization or window shading function (col. 4 lines 29-31). It should be noted that in the appellant's specification is disclose that the point spread function is determined by the size of the transducer aperture employed and the apodization used at the aperture (see pg. 4, 2nd paragraph of appellant's disclosure). Seyed teaches controlling both parameters as disclosed above, therefore controlling the point spread function of the beam. With respect to the appellant's argument regarding controlling the aperture function and the line density. Seyed teaches controlling the aperture function as disclosed above. Seyed further teaches a scan controller which controls the beam distribution and the beam density (col. 4, lines

6-9). Therefore, it would have been obvious to one ordinary skilled in the art to further vary the aperture width of the transducer in order to provide a desired point spread function parameter. With respect to claim 3, controlling the aperture function will inherently control for a narrower or broader beam profile. With respect to claim 4, Seyed further teaches that the transducer array can vary each successive firing ray to obtain a steering angle which is significantly different than the steering angle of the previous firing ray (col. 5, lines 47-50), therefore providing for beam overlapping. With respect to claim 5-6 and 14-15 regarding the Nyquist criterion, see rejection above. With respect to claims 7 and 8, in the absence of any showing of criticality, it would have been obvious to one ordinary skilled in the art that having Seyed scanned a volumetric area in azimuth and longitudinal dimension, the invention of Seyed would efficiently scan a volumetric region in both symmetrical/asymmetrical azimuth and elevation dimensions in order to provide a user desired scanning area. With respect to claims 1-13, 16, The Examiner maintains that it would have been obvious to one ordinary skilled in the art to use the apodization to control the point spread function and therefore providing a effective spatial sampling in order to provide an ultrasound transmitting/receiving mechanism that can improve the point spread function.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/J.S./
Examiner Art Unit 3737

Conferees:

/BRIAN CASLER/

Supervisory Patent Examiner, Art Unit 3737

/Brian K. Green/

Appeals Conference Specialist